

CLAIMS

1. A magnetic core material including a composite
material of a soft magnetic metal powder and plastic or
5 rubber,
wherein the soft magnetic metal powder is concatenated
by spontaneous magnetization to form a plurality of
aggregates, and
the longitudinal direction of each aggregate faces a
10 substantially fixed direction.

2. A magnetic core material including a composite
material of a soft magnetic metal powder having a diameter
of about 1 μm or less and plastic or rubber,
15 wherein the soft magnetic metal powder is concatenated
by spontaneous magnetization to form a plurality of
aggregates, and
the longitudinal direction of each aggregate faces a
substantially fixed direction.

20 3. The magnetic core material according to Claim 1 or
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wherein the volume ratio of the content of the soft
magnetic metal powder is in a range of 10% to 50%.

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4. The magnetic core material according to Claim 1 or 2,

wherein the volume ratio of the content of the soft magnetic metal powder is in a range of 10% to 40%.

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5. The magnetic core material according to any one of Claims 1 to 4,

wherein the soft magnetic metal powder includes any one of a nickel powder, a cobalt powder, and an iron powder which are obtained by reducing an oxide.

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6. The magnetic core material according to any one of Claims 1 to 4,

wherein the soft magnetic metal powder includes any one of a nickel powder, a cobalt powder, and an iron powder by using a gas phase method.

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7. The magnetic core material according to any one of Claims 1 to 4,

wherein the soft magnetic metal powder includes any one of a nickel powder, a cobalt powder, and an iron powder which are obtained by reducing a solution containing metallic ions.

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8. The magnetic core material according to any one of

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Claims 1 to 4,

wherein the soft magnetic metal powder includes a carbonyl nickel powder or a carbonyl iron powder.

5 9. An antenna in which a spiral conductor pattern is formed on one surface of the magnetic core material worked in the form of a plate according to any one of Claims 1 to 8.

10 10. An antenna in which a spiral conductor pattern is formed on one surface of the magnetic core material worked in the form of a plate according to any one of Claims 1 to 8, and a conductive material is disposed on the other surface of the magnetic core material.

15 11. The antenna according to Claim 9 or 10, wherein the plate-like magnetic core material consists of a plurality of magnetic core material pieces in which the longitudinal directions of the aggregates of the soft magnetic metal powder are different from each other.

20 12. The antenna according to any one of Claims 9 to 11, wherein the conductor pattern is formed in a rectangular shape, and the plate-like magnetic core material is disposed so as to be overlapped with only one side or two
25 opposite sides of the rectangular conductor pattern, as

viewed from a direction orthogonal to a surface of the plate-like magnetic core material.

13. An antenna in which a leading wire is wound around
5 the magnetic core material worked in the form of a plate according to any one of Claims 1 to 8 such that the magnetic axis of the magnetic core material may substantially coincide with the longitudinal directions of the aggregates of the soft magnetic metal powder.

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14. The antenna according to any one of Claims 9 to 13,
wherein the antenna is used for an RFID tag or an RFID reader/writer which uses at least a VHF band or a UHF band as a communication frequency.

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15. A method of manufacturing a magnetic core material using a composite material of a soft magnetic metal powder and plastic, the method comprising heating and kneading the soft magnetic metal powder and the plastic and thereafter
20 working the kneaded composite by using any one method of extruding, rolling, rolling after extruding, drawing after extruding, and rolling after injection so that the longitudinal directions of a plurality of aggregates formed by concatenating the soft magnetic metal powder by
25 spontaneous magnetization may face a substantially fixed

direction.

16. A method of manufacturing a magnetic core material
using a composite material of a soft magnetic metal powder
5 and plastic, the method comprising applying a direct-current
magnetic field after a film is coated with ink in which the
soft magnetic metal powder is suspended in a solvent which
has dissolved the plastic and before the coated film is
dried so that the longitudinal directions of a plurality of
10 aggregates formed by concatenating the soft magnetic metal
powder by spontaneous magnetization may be aligned in a
substantially fixed direction.